NUMERICAL SIMULATION OF MOVING INTERFACE PROBLEMS WITH THE ETILT

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In recent years, much effort has been devoted to development of numerical formulations for analysis of moving boundaries and interfaces. One of the main challenges has been how to update the interface without violating the mass conservation and while accurately representing the sudden changes in the materials properties (see [1-4] and references therein). The Edge-Tracked Interface Locator Technique (ETILT) was introduced in [1] to better enforce mass balance and to yield a sharper representation of the interface. In this technique the interface is defined by a combination of node-based and edge-based representations of an interface function. The time-evolution of the interface function is governed by a time-dependent advection equation. The mass conservation is accomplished with the edge-based representation of the interface function. The fluid densities and viscosities are also calculated with the edge-based representation. The objective in this work is to develop an algorithm based on the ETILT, with emphasis on the evaluation of its numerical performance, in particular its performance in terms of mass conservation and sharper representation of the interface. The test problems we use are the sloshing of a confined liquid and the solitary wave propagation.

References

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